28th; Montreal, 15th; Toronto, 22d; White River, 16th; Winnipeg, 1st, 19th; Minnedosa, 3d.

SUNSHINE AND CLOUDINESS.

The quantity of sunshine, and therefore of heat, received by the atmosphere as a whole is very nearly constant from year to year, but the proportion received by the surface of the earth depends upon the absorption by the atmosphere, and varies largely with the distribution of cloudiness. The sunshine is now recorded automatically at 23 regular stations of the Weather Bureau by its photographic, and at 38 by its thermal effects; at one of these stations records are kept by both methods. The photographic record sheets show the apparent solar time, but the thermometric records show seventy-fifth meridian time; for convenience the results are all given in Table X for each hour of local mean time. In order to complete the record of the duration of cloudiness these registers are supplemented by special personal observations of the state of the sky near the sun in the hours after sunrise and before sunset, and the cloudiness for these hours has been added as a correction to the instrumental records, whence there results a complete record of the duration of sunshine from sunrise to sunset.

The average cloudiness of the whole sky is determined by numerous personal observations at all stations during the daytime, and is given in the column "average cloudiness" in Table I; its complement, or percentage of clear sky, is given in the last column of Table X for the 60 stations at which instrumental self-registers are maintained.

COMPARISON OF DURATIONS AND AREAS.

The sunshine registers give the *durations* of effective sunshine whence the durations relative to possible sunshine are derived; the observers' personal estimates give the percentage of *area* of clear sky. These numbers have no necessary relation to each other, since stationary banks of clouds may obscure the sun without covering the sky, but when all clouds have a steady motion past the sun and are uniformly scattered over the sky, the percentages of duration and of area agree closely. For the sake of comparison, these percentages have been brought together, side by side, in the following table, from which it appears that, in general, the instrumental records of percentages of durations of sunshine are almost always larger than the observers' personal estimates of percentages of area of clear sky; the average excess for May, 1897, is 12 per cent for photographic and 12 per cent for thermometric records.

The details are shown in the accompanying table, in which the stations are arranged according to the *total possible* duration of sunshine, and not according to the *observed* duration.

Difference between instrumental and personal observations of sunshine.

Stations.	Latitude.		Apparatus.	For whole month.		Instrumental record of sunshine.			
				Total possible.	Personal.	Photographic.	Difference.	Thermometric.	Difference.
	°	′		Hrs.	%	%	%	%	%
Key West	24	34	T.	410.2	47	.....	.....	67	+20
Tampa, Fla	27	57	T.	416.2	64	.....	.....	71	+ 7
Galveston, Tex	29	18	P.	419.0	79	90	+11	.....	.....
New Orleans, La	29	58	T.	420.9	45	.....	.....	44	− 1
Savannah, Ga	32	05	P.	425.8	48	73	+25	.....	.....
Vicksburg, Miss	32	22	T.	425.8	65	.....	.....	87	+22
San Diego, Cal	32	43	P.	428.7	61	58	− 3	.....	.....
Charleston, S. C.	32	47	T.	428.7	50	.....	.....	67	+17
Phœnix, Ariz	32	28	P.	428.7	88	98	+10	.....	.....
Atlanta, Ga	33	45	T.	431.5	53	.....	.....	56	+ 3
Los Angeles, Cal	34	06	P.	431.5	61	76	+15	.....	.....
Wilmington, N. C.	34	14	P.	431.5	62	74	+12	.....	.....
Little Rock, Ark	34	45	T.	434.3	54	.....	.....	86	+32
Chattanooga, Tenn	35	04	T.	434.3	56	.....	.....	63	+ 6
Santa Fe, N. Mex	35	41	P.	437.2	64	75	+11	.....	.....
Raleigh, N. C.	35	45	T.	437.2	46	.....	.....	73	+17
Nashville, Tenn	36	10	T.	437.2	65	.....	.....	71	+ 6
Fresno, Cal	36	43	T.	440.2	83	.....	.....	84	+ 1
Dodge City, Kans	37	45	P.	443.1	61	73	+12	.....	.....
San Francisco, Cal	37	48	T.	443.1	63	.....	.....	82	+19
Louisville, Ky	38	15	T.	443.1	46	.....	.....	71	+25
St. Louis, Mo	38	38	T.	445.9	42	.....	.....	69	+27
Washington, D. C	38	54	P.	445.9	46	58	+12	.....	.....
Kansas City, Mo	39	05	P.	445.9	37	46	+ 9	.....	.....
Cincinnati, Ohio	39	06	P.	445.9	58	.....	.....	78	+20
Baltimore, Md	39	18	T.	445.9	45	.....	.....	49	+ 4
Atlantic City, N. J	39	22	T.	445.9	46	56	+10	.....	.....
Denver, Colo	39	45	P.	449.0	44	70	+26	.....	.....
Indianapolis, Ind	39	46	T.	449.0	66	.....	.....	75	+ 9
Philadelphia, Pa	39	57	T.	449.0	39	.....	.....	54	+15
Columbus, Ohio	39	58	T.	449.0	50	.....	.....	74	+24
Harrisburg, Pa	40	16	T.	449.0	39	.....	.....	67	+28
Pittsburg, Pa	40	32	T.	451.9	50	.....	.....	54	+ 4
New York, N. Y	40	43	T.	451.9	45	.....	.....	64	+19
Salt Lake City, Utah	40	46	P.	451.9	40	71	+31	.....	.....
Eureka, Cal	40	48	P.	451.9	45	48	+ 3	.....	.....
Cheyenne, Wyo	41	08	P.	451.9	51	58	+ 7	.....	.....
Omaha, Nebr	41	16	P.	451.9	41	60	+19	.....	.....
Cleveland, Ohio	41	30	T.	456.2	43	.....	.....	52	+ 9
Des Moines, Iowa	41	35	T.	456.2	50	.....	.....	56	+ 6
Chicago, Ill	41	53	T.	456.2	47	.....	.....	52	+ 5
Erie, Pa	42	07	T.	456.2	43	.....	.....	48	+ 5
Binghamton, N. Y	42	08	T.	456.2	49	.....	.....	57	+ 8
Detroit, Mich	42	20	T.	456.2	58	.....	.....	69	+11
Boston, Mass	42	21	T.	456.2	43	.....	.....	56	+13
Dubuque, Iowa	42	30	T.	456.2	55	.....	.....	56	+ 1
Albany, N. Y	42	39	T.	459.9	45	.....	.....	66	+21
Buffalo, N. Y	42	53	T.	459.9	44	.....	.....	65	+21
Rochester, N. Y	43	06	T.	459.9	49	.....	.....	54	+ 5
Idaho Falls, Idaho	43	29	T.	459.9	56	.....	.....	69	+ 6
Portland, Me	43	39	T.	463.5	33	.....	.....	45	+12
Northfield, Vt	44	10	P.	463.5	31	49	+18	.....	.....
Eastport, Me	44	54	P.	466.7	32	47	+15	.....	.....
St. Paul, Minn	44	58	P.	466.7	33	44	+11	.....	.....
Minneapolis, Minn	44	59	T.	466.7	.....	45	.....	.....	.....
Portland, Oreg	45	32	T.	471.7	42	.....	.....	45	+ 3
	45	32	P.	471.7	42	38	− 4	.....	.....
Helena, Mont	46	34	P.	475.6	45	51	+ 6	.....	.....
Bismarck, N. Dak	46	47	P.	475.6	49	61	+12	.....	.....
Seattle, Wash	47	38	T.	479.8	32	.....	.....	46	+14
Spokane, Wash*	47	40	P.	479.8	36	.....	.....	.....	.....

*Instrument out of order.

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Snowfall and rainfall are expressed in inches.

Alabama.—The mean temperature was 80.9°, or 3.1° above normal; the highest was 105°, at Hamilton on the 27th and at Pineapple on the 29th, and the lowest, 44°, at Maple Grove on the 1st. The average precipitation was 1.85, or 2.95 below normal; the greatest monthly amount, 4.42, occurred at Newburg, and the least, 0.25, at Brewton.—*F. P. Chaffee.*

Arizona.—The mean temperature was 78.3°, or 1.3° above normal; the highest was 113°, at Fort Mojave on the 4th, and the lowest, 31°, at Williams on the 16th. The average precipitation was 0.09, or 0.27 below normal; the greatest amount, 0.75, occurred at Cedar Springs, while none fell at nineteen stations.—*W. T. Blythe.*

Arkansas.—The mean temperature was 78.2°, or 1.3° above normal; the highest was 106°, at Jonesboro on the 12th and at Warren on the 22d, and the lowest, 41°, at Jonesboro on the 1st and 5th and at Silver Springs on the 4th. The average precipitation was 3.46, or 0.59 below normal; the greatest monthly amount, 6.90, occurred at Dallas, and the least, 0.60, at Arkansas City.—*F. H. Clarke.*

California.—The mean temperature was 69.8°, or 1.0° below normal; the highest was 118°, at Volcano Springs, and the lowest, 26°, at Snedden's Ranch. The average precipitation was 0.46, or 0.15 above nor-